

CLAIMS

1-90. (canceled)

91. (previously presented) Apparatus for generating a predistorted signal from an input signal to reduce distortion in an output signal generated by signal handling equipment based on the predistorted signal, the apparatus comprising:
an extractor adapted to generate an extracted signal from the input signal;
a generator adapted to generate a distortion signal based on the extracted signal, wherein the distortion signal comprises:
a second-order distortion component based on a second-order signal generated from the extracted signal; and
a fourth-order distortion component based on a fourth-order signal generated from the extracted signal; and
a modulator adapted to modulate the input signal based on the distortion signal to generate the predistorted signal.

92. (previously presented) The invention of claim 91, wherein the distortion signal further comprises a sixth-order distortion component based on a sixth-order signal generated from the extracted signal.

93. (previously presented) The invention of claim 91, wherein the distortion signal does not comprise any odd-order distortion components based on any odd-order signal generated from the extracted signal.

94. (previously presented) The invention of claim 91, wherein the generator is a digital generator adapted to digitally generate the distortion signal.

95. (previously presented) The invention of claim 91, wherein:
the distortion signal comprises an in-phase component and a quadrature component;
the in-phase signal comprises:
a first in-phase component based on the second-order signal; and
a second in-phase component based on the fourth-order signal; and
the quadrature signal comprises:
a first quadrature component based on the second-order signal; and
a second quadrature component based on the fourth-order signal.

96. (previously presented) The invention of claim 95, wherein:
the in-phase signal further comprises a third in-phase component based on a sixth-order signal generated from the extracted signal; and
the quadrature signal further comprises a third quadrature component based on a sixth-order signal generated from the extracted signal.

97. (previously presented) The invention of claim 91, wherein the modulator is adapted to:
divide the input signal into an in-phase component and a quadrature component;
multiply one of the in-phase and quadrature components by the distortion signal to generate a first product;
multiply the other component by only a first DC distortion component to generate a second product; and
combine the first and second products to generate the predistorted signal.

1 98. (previously presented) The invention of claim 97, wherein the distortion signal further
2 comprises a second DC distortion component.

1 99. (previously presented) The invention of claim 91, further comprising automatic gain
2 control (AGC) circuitry adapted to condition the extracted signal such that an envelope of the
3 conditioned signal maintains a substantially constant amplitude.

1 100. (previously presented) The invention of claim 91, further comprising a controller
2 adapted to control operations of the generator.

1 101. (previously presented) The invention of claim 100, further comprising one or more
2 mixers, each mixer adapted to multiply a portion of the extracted signal by a portion of the output signal
3 to generate an input signal to the controller.

1 102. (previously presented) The invention of claim 101, wherein the one or more mixers
2 comprise:
3 a first mixer adapted to multiply an in-phase portion of the extracted signal by a first portion of
4 the output signal to generate an in-phase input signal to the controller; and
5 a second mixer adapted to multiply a quadrature portion of the extracted signal by a second
6 portion of the output signal to generate a quadrature input signal to the controller.

1 103. (previously presented) The invention of claim 100, wherein the controller comprises two
2 or more control paths, each control path adapted to generate a different-order control signal used by the
3 generator to generate a different-order distortion component in the distortion signal.

1 104. (previously presented) The invention of claim 103, wherein each control path comprises:
2 a mixer adapted to multiply a portion of the output signal by a different-order signal generated
3 from the extracted signal to generate a product; and
4 an integrator adapted to integrate the product to generate a corresponding control signal.

1 105. (previously presented) The invention of claim 103, wherein:
2 the controller comprises a transformer adapted to generate different-frequency components of the
3 output signal; and
4 each control path comprises:
5 a detector adapted to detect a power level of a different-frequency output component;
6 and
7 an integrator adapted to integrate the detected power level to generate a corresponding
8 control signal.

1 106. (previously presented) The invention of claim 103, wherein each control path comprises:
2 a band-pass filter adapted to isolate a different-frequency component of the output signal;
3 a detector adapted to detect a power level of the different-frequency output component; and
4 an integrator adapted to integrate the detected power level to generate a corresponding control
5 signal.

1 107. (previously presented) The invention of claim 91, wherein the input signal is an analog
2 RF signal.

1 108. (previously presented) The invention of claim 91, wherein the input signal comprises
2 baseband in-phase and quadrature components.

1 109. (previously presented) The invention of claim 91, wherein:
2 the modulator comprises a phase shifter, an amplitude modulator, and a coupler;
3 the amplitude modulator is adapted to modulate the amplitude of the input signal based on the
4 distortion signal; and
5 the coupler is adapted to combine the outputs from the phase shifter and the amplitude modulator
6 to generate the predistorted signal.

1 110. (previously presented) The invention of claim 109, wherein:
2 the phase shifter is adapted to shift the phase of a first portion of the input signal; and
3 the amplitude modulator is adapted to modulate the amplitude of a second portion of the input
4 signal, different from the first portion.

1 111. (previously presented) The invention of claim 109, further comprising a second phase
2 shifter adapted to shift phase of one of a portion of the extracted signal and a portion of the output signal,
3 wherein the portions are combined to generate a signal used to control operations of the generator.

1 112. (previously presented) The invention of claim 91, wherein the signal handling
2 equipment comprises an amplifier.

1 113. (previously presented) A method for generating a predistorted signal from an input
2 signal to reduce distortion in an output signal generated by signal handling equipment based on the
3 predistorted signal, the method comprising:
4 generating an extracted signal from the input signal;
5 generating a distortion signal based on the extracted signal, wherein the distortion signal
6 comprises:
7 a second-order distortion component based on a second-order signal generated from the
8 extracted signal; and
9 a fourth-order distortion component based on a fourth-order signal generated from the
10 extracted signal; and
11 modulating the input signal based on the distortion signal to generate the predistorted signal.

1 114. (previously presented) The invention of claim 113, wherein the distortion signal further
2 comprises a sixth-order distortion component based on a sixth-order signal generated from the extracted
3 signal.

1 115. (previously presented) The invention of claim 113, wherein the distortion signal does
2 not comprise any odd-order distortion components based on any odd-order signal generated from the
3 extracted signal.

1 116. (previously presented) The invention of claim 113, wherein the distortion signal is
2 generated digitally.

1 117. (previously presented) The invention of claim 113, wherein:
2 the distortion signal comprises an in-phase component and a quadrature component;
3 the in-phase signal comprises:
4 a first in-phase component based on the second-order signal; and
5 a second in-phase component based on the fourth-order signal; and
6 the quadrature signal comprises:
7 a first quadrature component based on the second-order signal; and
8 a second quadrature component based on the fourth-order signal.

1 118. (previously presented) The invention of claim 117, wherein:
2 the in-phase signal further comprises a third in-phase component based on a sixth-order signal
3 generated from the extracted signal; and
4 the quadrature signal further comprises a third quadrature component based on a sixth-order
5 signal generated from the extracted signal.

1 119. (previously presented) The invention of claim 113, wherein the modulating comprises:
2 dividing the input signal into an in-phase component and a quadrature component;
3 multiplying one of the in-phase and quadrature components by the distortion signal to generate a
4 first product;
5 multiplying the other component by only a first DC distortion component to generate a second
6 product; and
7 combining the first and second products to generate the predistorted signal.

1 120. (previously presented) The invention of claim 119, wherein the distortion signal further
2 comprises a second DC distortion component.

1 121. (previously presented) The invention of claim 113, further comprising conditioning the
2 extracted signal such that an envelope of the conditioned signal maintains a substantially constant
3 amplitude.

1 122. (previously presented) The invention of claim 113, further comprising controlling
2 operations of the generating.

1 123. (previously presented) The invention of claim 122, further comprising multiplying a
2 portion of the extracted signal by a portion of the output signal to generate an input signal for the
3 controlling.

1 124. (previously presented) The invention of claim 123, comprising:
2 multiplying an in-phase portion of the extracted signal by a first portion of the output signal to
3 generate an in-phase input signal for the controlling; and
4 multiplying a quadrature portion of the extracted signal by a second portion of the output signal
5 to generate a quadrature input signal for the controlling.

1 125. (previously presented) The invention of claim 122, comprising, for two or more control
2 paths, generating a different-order control signal used for the generating to generate a different-order
3 distortion component in the distortion signal.

1 126. (previously presented) The invention of claim 125, comprising, for each control path:
2 multiplying a portion of the output signal by a different-order signal generated from the extracted
3 signal to generate a product; and
4 integrating the product to generate a corresponding control signal.

1 127. (previously presented) The invention of claim 125, wherein:
2 the controlling comprises generating different-frequency components of the output signal; and
3 comprising, for each control path:
4 detecting a power level of a different-frequency output component; and
5 integrating the detected power level to generate a corresponding control signal.

1 128. (previously presented) The invention of claim 125, comprising, for each control path:

isolating a different-frequency component of the output signal;
detecting a power level of the different-frequency output component; and
integrating the detected power level to generate a corresponding control signal.

129. (previously presented) The invention of claim 113, wherein the input signal is an analog RF signal.

130. (previously presented) The invention of claim 113, wherein the input signal comprises baseband in-phase and quadrature components.

131. (previously presented) The invention of claim 113, wherein the modulating comprises:
shifting the phase of the input signal;
modulating the amplitude of the input signal based on the distortion signal; and
combining the outputs from the phase shifting and the amplitude modulating to generate the predistorted signal.

132. (previously presented) The invention of claim 131, wherein:
the phase shifter is adapted to shift the phase of a first portion of the input signal; and
the amplitude modulator is adapted to modulate the amplitude of a second portion of the input signal, different from the first portion.

133. (previously presented) The invention of claim 131, further comprising shifting the phase of one of a portion of the extracted signal and a portion of the output signal, wherein the portions are combined to generate a signal used to control operations of the generating.

134. (previously presented) The invention of claim 113, wherein the signal handling equipment comprises an amplifier.

135. (previously presented) Apparatus for generating a predistorted signal from an input signal to reduce distortion in an output signal generated by signal handling equipment based on the predistorted signal, the apparatus comprising:
means for generating an extracted signal from the input signal;
means for generating a distortion signal based on the extracted signal, wherein the distortion signal comprises:
a second-order distortion component based on a second-order signal generated from the extracted signal; and
a fourth-order distortion component based on a fourth-order signal generated from the extracted signal; and
means for modulating the input signal based on the distortion signal to generate the predistorted signal.

136. (currently amended) Apparatus for generating a predistorted signal from an input signal to reduce distortion in an output signal generated by signal handling equipment based on the predistorted signal, the apparatus comprising:
an extractor adapted to generate an extracted ~~signals~~ signal from the input signal;
automatic gain control (AGC) circuitry adapted to condition the extracted signal so that the conditioned signal envelope maintains a substantially constant amplitude;
a generator adapted to generate a distortion signal based on the conditioned signal; and
a modulator adapted to modulate the input signal based on the distortion signal to generate the predistorted signal.

1 137. (currently amended) A method for generating a predistorted signal from an input signal
2 to reduce distortion in an output signal generated by signal handling equipment based on the predistorted
3 signal, the method comprising:

4 generating an extracted ~~signals~~ signal from the input signal;
5 conditioning the extracted signal so that the conditioned signal envelope maintains a
6 substantially constant amplitude;
7 generating a distortion signal based on the conditioned signal; and
8 modulating the input signal based on the distortion signal to generate the predistorted signal.

1 138. (previously presented) Apparatus for generating a predistorted signal from an input
2 signal to reduce distortion in an output signal generated by signal handling equipment based on the
3 predistorted signal, the apparatus comprising:

4 means for generating an extracted signal from the input signal;
5 means for conditioning the extracted signal so that the conditioned signal envelope maintains a
6 substantially constant amplitude;
7 means for generating a distortion signal based on the conditioned signal; and
8 means for modulating the input signal based on the distortion signal to generate the predistorted
9 signal.

1 139. (previously presented) The invention of claim 91, wherein the generator is adapted to
2 generate at least one of the distortion components using a polynomial-based technique or a look-up table-
3 based technique.

1 140. (previously presented) The invention of claim 113, wherein at least one of the distortion
2 components is generated using a polynomial-based technique or a look-up table-based technique.

1 141. (previously presented) The invention of claim 91, wherein:
2 the generator is adapted to generate first and second distortion signals based on the extracted
3 signal; and
4 the modulator is adapted to:
5 divide the input signal into an in-phase component and a quadrature component;
6 multiply the in-phase component by the first distortion signal to generate a first product;
7 multiply the quadrature component by the second distortion signal to generate a second
8 product; and
9 combine the first and second products to generate the predistorted signal.

1 142. (previously presented) The invention of claim 113, wherein:
2 first and second distortion signals are generated based on the extracted signal; and
3 the input signal is modulated by:
4 dividing the input signal into an in-phase component and a quadrature component;
5 multiplying the in-phase component by the first distortion signal to generate a first
6 product;
7 multiplying the quadrature component by the second distortion signal to generate a
8 second product; and
9 combining the first and second products to generate the predistorted signal.